AN INTERNATIONALLY COOPERATIVE FIELD STUDY OF THE SNOW LEOPARD IN NORTHERN INDIA

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INTRODUCTION

Recognizing the immediate threat to the survival of the snow leopard *(Panthera uncia)* in the wild, the Government of India and the United States Fish and Wildlife Service have agreed to a cooperative effort to develop a conservation program for the snow leopard in northern India. Institutions participating in the project include the Wildlife Institute of India, the University of Washington, the Woodland Park Zoological Gardens, and the International Snow Leopard Trust.

The newly created Wildlife Institute of India was formed, in part, to support research on threatened wildlife species of the subcontinent. This is the first internationally cooperative study being conducted through the auspices of the Wildlife Institute. The Wildlife Science Group at the University of Washington has been involved in the development of a wildlife biology curriculum at the Wildlife Institute of India, and thus continues its collaboration with Institute personnel. The Woodland Park Zoological Gardens has a highly successful captive breeding program for the snow leopard and has been a strong advocate for its preservation, while the International Snow Leopard Trust is a non-profit organization dedicated to the preservation of the snow leopard and its mountain habitat.

The snow leopard project is envisioned as a multi-year effort centering on a field study of snow leopard ecology. It will also include United States-based training of Indian *re*searchers in the techniques necessary for executing surveys and intensive field studies on the snow leopard. During the study, printed educational material and a film related to snow leopard 'conservation will be prepared for distribution in India and world-wide.

BACKGROUND

Within India the snow leopard occurs along the northern border in Arunachal Pradesh, Sikkim, Uttar Pradesh, Himachal Pradesh, and Jammu and Kashmi *r* (Prater 1971, Dang 1967, Saharia 1982, Green 1982, Osborne et a!. 1983). Sixty years ago Burrard (1925), refcorring to the Ladakh districh of Jammu and Kashmir, wrote: "In the Zaskar Range snow leopards abound, and levy a heavy toll on the burrhel and ibex, frequently clearing a nullah of game for the time being. When marching and shooting in the Zaskar Range I have day after day come on fresh tracks of these creatures, but I have never seen one, and I am sure that it is only on account of their noctumal habits that they are so seldom encountered, not because they are in any way rare." Dang (1961) reported there were numerous snow leopards in the Nanda Devi Sanctuary of Uttar Pradesh, while later estimating (Dang 1967) that there were only between 200 and 600 left in the entire Himalayan *region.* Green (1982) indicated that snow leopard populations continue to decline in North India.

The Ladakh district of Jammu and Kashmir State includes a large area of potentia] snow leopard habitat, and recent reports indicate that relatively undisturbed snow Jeopard populations may exist in a few sites (Green) 982, Osborne et a!. 1983). Since the Ladakh district is known to support snow leopard populations and includes some relatively accessible snow leopard habitat, it may provide a feasible study site for an intensive ecological investigation.

The decline of snow leopard populations in the wild has been attributed to three major factors. First, the snow leopard is hunted by indigenous people for its valuable pelt and to protect livestock (Schaller 1977, Jackson 1979a&b, Osborne et a!. 1983). Second,

ungulate prey of the snow leopard, primarily wild sheep and goats, have been reduced by hunting for human consumption (Schaller 1977, Jackson I 979a&b). Third, domestic livestock have displaced wild ungulates from preferred grazing areas (Jackson 1979a, Osborne et al. 1983). If these trends continue it is doubtful that the snow leopard will survive except in a few isolated areas or in captivity.

Preliminary studies on the behavior and ecology of snow leopards in the wild are restricted to a few reports of habitats used, food habits and hunting behavior (Kuznetsov and Matyushkin 1962, Hemmer 1972, Schaller 1977, Jackson 1979a&b). The paucity of ecological data is a reflection of the scarcity and secretive nature of the snow leopard, and the harsh climate and rugged terrain in which it occurs. However, in 1978 intensive field studies of snow leopards were begun in western Nepal. These investigations are providing information on habitat selection (R. Jackson, unpubl. data), and may be useful in developing techniques to assess presence and relative abundance of snow leopards in India.

Apart from abundance of snow leopards, density estimates of prey species are essential in assessing the ability of an area to support snow leopards. Large ungulates such as wild sheep and goats are probably the major prey of the snow leopard, although smaller mammals and birds are also known to be taken (Hemmer 1972, Schaller 1977). Both Schaller (1977) and Jackson (1979a) found bharal *(Pseudois nayaur)* in at least 50 percent of snow leopard scats from Nepal. Domestic livestock (primarily sheep and goats) are common food items in areas where native ungulates have been depleted, and in most areas they form at least a portion of snow leopard diet (Schaller 1977). The more common wild ungulate prey of the snow leopard in India probably include the bharal, ibex *(Capra ibex),* Himalayan tahr *(Hemitragus jemlahicus),* and urial *(Ovis orientalis)*. Population counts exist for these species in a few areas of the Himalayas (Fox 1974, Schaller and Khan 1975, Schaller 1973 a&b, 1976, 1977, Green 1978, Wegge 1979, Wilson 1981, Mallon 1983). These studies indicate the potential for collecting substantial data on the ungulate prey base of the snow leopard. Comparisons of prey densities between sites will be essential in assessing habitat quality and carrying capacity for the snow leopard.

With estimates of snow leopard abundance, prey abundance, and information on the number of prey taken per unit time, one can begin to determine some relationships between food availability and snow leopard density. Other factors affecting their density include human interaction with both the snow leopard and its prey (e.g., hunting), and the degree of competition between livestock and wild ungulate prey. An understanding of all these factors will be essential in preparing a conservation program designed to allow the continued co-existence of humans and snow leopards in the mountains of northern India.

OBJECTIVES Phase I:

1. To assess the status of snow leopard popu lations and prey base in selected areas of northern India
2. To collaborate with Indian researchers in: a. adapting current techniques for estimating predator and prey populations to this field investigation b. developing techniques for assessing habitat quality relative to snow leopard in northern India
3. To identify sites suitable for in-depth study of the ecology of the snow leopard
4. To develop education materials pertaining to snow leopard conservation

The major objective for the first phase of this project is to assess the status of snow leopard and its associated prey in selected areas of northern India. The surveys will be carried out by a U.S. biologist and two Indian research scholars, appointed by the Government of India, who will act as counterparts. The research scholars will be trained in field techniques for population estimation appropriate to the rugged mountain habitat of the snow leopard. They will also receive some additional training in ecological research at the University of Washington with opportunity for observing captive snow leopards at the Woodland Park Zoological Gardens.

Final selection of the areas to be surveyed will be made by the Government of India after consultation with scientists who have worked in snow leopard habitat and with local conservation officials who are familiar with logistical constraints and animal presence. Areas will be selected on the basis of probable presence

of viable snow leopard populations, habitat characteristics typical of known snow leopard populations, and ease of access. Once the surveys proposed here are completed, these same criteria will be reassessed to identify an area for a long-term study of snow leopard ecology.

The second phase of the project will concentrate on the intensive study of snow leopard ecology. Planned techniques include radiotelemetry which will be employed in tracking marked individuals to elicit information on home range, movements, activity patterns, and social behavior of snow leopards in the wild. This type of work has been initiated in Nepal where R. Jackson (pers. comm.) has demonstrated its feasibility. In India we will be providing comparative and additional information on snow leopard ecology for a new and different habitat in the Himalaya. A more benign logistical situation in northern India should also make the execution of such a study more practical than in Nepal.

Development of education materials

Concurrent with the ecological survey, conservation education programs will be developed for distribution in cities and, as the project progresses, for use in the mountain villages. The need for these programs is underscored by the fact that even in a remote area such as Ladakh, much of the region is utilized for either livestock grazing, subsistence farming, or firewood collection. This puts wilderness preservation in direct competition with basic human needs. As George Schaller (1980) has emphasized, "There is a tendency to think of ecological problems as scientific and technological when they are actually social and cultural" .

In facilitating an understanding of the importance of conservation measures for the snow leopard and its mountain habitat, the education materials will focus on how such measures would benefit the local human populations. In the first phase of the project education materials will include a pamphlet, illustrated in comic-book style and telling a fable; a poster; and the initiation of a 16 mm film on Himalayan wildlife. The film will be narrated in English for distribution internationally on public television, and in Urdu for local viewing.

A recent article on wildlife of Ladakh (Osborne et al. 1983) concluded with the statement: "Any conservation measures adopted will have to take in to account the needs and traditional rights and patterns of life of these people and resolve in an equitable way any apparent conflict between the needs of wildlife, the people and the preservation of the environment as a whole. It is clear that wildlife can no longer depend on the remoteness of its range for survival." It is apparent that this is especially true for the snow leopard.

On the tenth anniversary of Project Tiger, India has received world-wide acciaim for its role in the conservation of endangered species. With the initiation of the present project, we are hopefully taking a major step in the rescue of another species in peril, the snow leopard.

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